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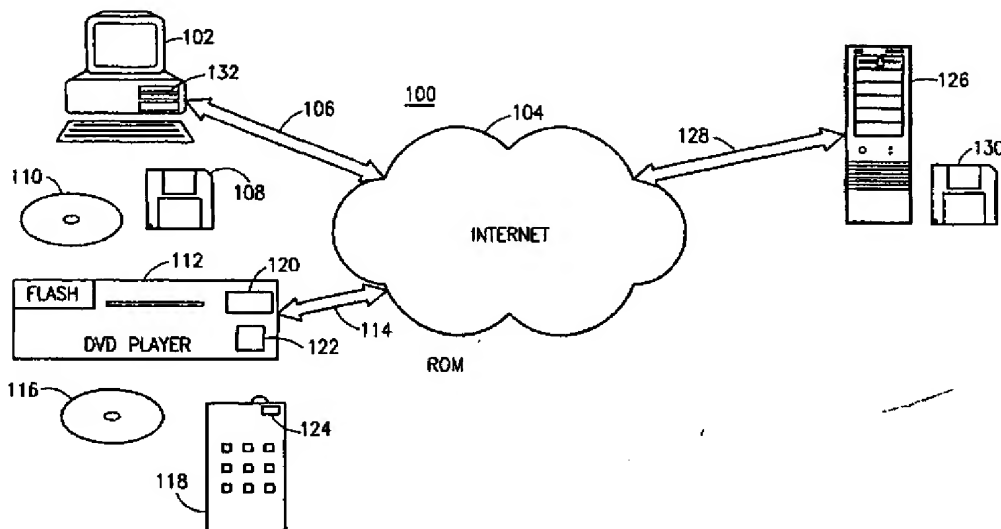
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(54) Title: METHOD AND APPARATUS FOR INTERACTIVELY ACCESSING MULTIMEDIA INFORMATION ASSOCIATED WITH A SPECIFIC DVD



(57) Abstract: A DVD client device (102, 112) such as DVD drive (206) equipped (PC 102) or DVD player (112) executes a program which calculates a DVD signature (step 510) from navigation information which is read from a DVD (110) and stored in RAM. The DVD signature is sent to a DVD information server (126) and is used to identify particular web content (step 604) that relates to the DVD. The web content can include promotional material specific to the DVD or related products. Statistical information on DVD viewership can be collected by the DVD information server (step 710). User's ID (email) (712) can be stored for transmission of future promotional materials. Copyright checking and alerting can also be carried out by the DVD information server.

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METHOD AND APPARATUS FOR INTERACTIVELY ACCESSING MULTIMEDIA
INFORMATION ASSOCIATED WITH A SPECIFIC DVD

Technical Field

This invention pertains to interactive entertainment devices, software, and methods and, more particularly, to a networked interactive Digital Versatile Disk (DVD) based entertainment system.

Background Art

During the course of the last five years, the Internet has grown immensely. Although based on a system originally intended for military communication and scientific collaboration, the present day use is dominated by business and personal communication, and to a lesser extent entertainment applications.

In regard to the latter applications, various forms of entertainment multimedia are available via the Internet. Multimedia available over the Internet includes, but is not limited to, music audio files audio files in MP3 or .wav format, and movie or movie excerpt files in Motion Picture Expert Group (MPEG) format among others.

Unfortunately, in the case of movie files, the current bandwidth of a typical connection to the Internet, makes it impractical for the average user to download high quality full length movies.

Thus there is still a need for transportable, readable memory media such as Digital Versatile Disk (DVD) to distribute recordings of movies and other commercial video products. A DVD can provide a data output rate of 9.8 mega bytes per second which is sufficient to produce very high quality video playback. A typical high speed Internet connection can only sustain a video stream at a rate of 1.5mega bytes per second. Which is insufficient to provide a high quality video.

Unfortunately, by not using distribution through the Internet the flexibility for associating the recording with other complementary Internet based information that could be updated and revised as needed to achieve marketing and entertainment objectives associated with the recording is lost.

For example it would be advantageous if a user's DVD could be dynamically updated in response to the anticipated release of a new film release by a director who produced a movie

1 recorded on the user's DVD, so that the user would see promotional related to the anticipated
2 release.

3 In the case of media such as audio recordings that can readily be distributed over the
4 Internet, it is also possible to collect statistical information on an audience accessing the media,
5 e.g., information similar to Nielson ratings, such as the frequency and timing of access. On the
6 other hand, in the case of DVDs it is only possible to collect sales information. It is not possible
7 to obtain average data corresponding to how many times a DVD recording is played.

8 There is an issue of unauthorized DVD copying and sales. It is difficult control or even
9 track the volume of such unauthorized activity.

10 Accordingly what is needed is a system and method which seamlessly integrates the
11 Internet, e.g., the Web, with a personal DVD disk player.

12 Disclosure of the Invention

13 A method for operating a DVD client device comprises steps of reading navigation
14 information from a DVD, calculating a DVD signature from the navigation information,
15 detecting user activation of an info link control, and transmitting the DVD signature to a DVD
16 information server in response to detecting user activation of the info link control.

17 A DVD client device such a DVD drive equipped PC or DVD player executes a program
18 which calculates a DVD signature from navigation information which is read from a DVD and
19 stored in RAM. The DVD signature is sent to a DVD information server and is used to identify
20 particular web content that relates to the DVD. The web content can include promotional
21 material specific to the DVD or related products. Statistical information on DVD viewership can
22 be collected by the DVD information server. User's ID (email) can be stored for transmission
23 of future promotional materials. Copyright checking and alerting can also be carried out by the
24 DVD information server

25 According to another aspect of the invention a system and computer readable medium is
26 disclosed for carrying out the above method.

27 Brief Description of the Drawings

28 The subject matter which is regarded as the invention is particularly pointed out and
29 distinctly claimed in the claims at the conclusion of the specification. The foregoing and other
30 objects, features, and advantages of the invention will be apparent from the following detailed
31 description taken in conjunction with the accompanying drawings.

1 FIG. 1 is a schematic of a computer systems according to a preferred embodiment of the
2 invention.

3 FIG. 2 is a hardware block diagram of DVD player according to a preferred embodiment
4 of the invention.

5 FIG. 3 is a hardware block diagram of a remote control according to a preferred
6 embodiment of the invention.

7 FIG. 4 is a depiction of a GUI interface for a DVD player application according to a
8 preferred embodiment of the invention.

9 FIG. 5 is a flowchart of a process carried out by the DVD player application or executed
10 by a DVD player processor according to a preferred embodiment of the invention.

11 FIG. 6 is a flowchart of a first process carried out by a DVD information server according
12 to a preferred embodiment of the invention.

13 FIG. 7 is a flowchart of a second process carried out by a DVD information server
14 according to a preferred embodiment of the invention.

15 FIG. 8 is a flowchart of a third process carried out by a DVD information server according
16 to a preferred embodiment of the invention.

17 FIG. 9 is a flowchart of a fourth process carried out by a DVD information server
18 according to a preferred embodiment of the invention.

19 FIG. 10 is a flow chart of a process performed by the DVD information server in response
20 to receiving a DVD signature from a DVD client

21 FIG. 11 is a first part of a flowchart of a sixth process carried out by a DVD information
22 server according to a preferred embodiment of the invention.

23 FIG. 12 is a second part of a flowchart of a sixth process carried out by a DVD
24 information server according to a preferred embodiment of the invention.

25 FIG. 13 is a flow chart of a first process for calculating a DVD signature based on
26 information read from a DVD C-PBIT according to a preferred embodiment of the invention.

27 FIG. 14 is a flow chart of a second process for calculating a DVD signature based on
28 information read from a DVD C-PBIT according to a preferred embodiment of the invention.

29 Detailed Description of Features of the Invention

30 It should be understood that the embodiments described in detail hereinafter are only
31 examples of the many advantageous uses of the innovative teachings herein. In general,

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1 statements made in the specification of the present application do not necessarily limit any of the
2 various claimed inventions. Moreover, some statements may apply to some inventive features
3 but not to others. In general, unless otherwise indicated, singular elements may be in the plural
4 and visa versa with no loss of generality.

5 FIG. 1 is a schematic of the computer system 100 used in connection with the present
6 invention.

7 A first DVD client device, a client computer 102 is connected to the Internet 104, through
8 a first bidirectional data link 106. The client computer may for example be an IBM compatible
9 PC computer comprising a DVD drive 132, a DVD decoder card (not shown) for decoding
10 recordings on a DVD read by DVD drive. A first computer readable medium 108 is provided
11 for loading software onto the client computer 102, for configuring it to carry out methods
12 according to the present invention which are described below with reference to flow diagrams.
13 A first DVD 110 containing a recording is provided to be read by the DVD drive 132.

14 A second DVD client device, a DVD player 112 provided with a network interface , is
15 connected to the Internet 104 through a second bidirectional data link 114. A second DVD 116
16 is provided for playing in the DVD player 112. A remote control 118 is provided for accepting
17 user inputs, and controlling functions of the DVD player. Although shown as a one hand remote
18 control, the remote control 118 can alternatively take the physical form of a qwerty keyboard
19 augmented with specialized function keys. In either case, the remote control comprises a remote
20 info link button 124. The remote info link button could be replaced by another type of control,
21 e.g. a switch or an on screen menu control. The DVD player 112 comprises a player info link
22 button 120. In one embodiment of the invention, the info link button 120, comprises an actual
23 button. In another embodiment of the invention, the infor link button 120 comprises an area of
24 a touch screen. The DVD player 112 also comprises a receiver 122 for receiving signals from the
25 remote control 118. Internal hardware schematics of the DVD player 112, and the remote control
26 112, are shown in FIG. 2 and FIG. 3 respectively.

27 A DVD information server 126 is connected to the Internet 104 through a third
28 bidirectional data link 128. The DVD information server, communicates with either the client
29 computer 102, or the DVD player 112.

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1 A second computer readable medium 130 is provided for configuring the DVD
2 information server 126 to perform processes according to the teachings of the invention which
3 are described below with reference to flow diagrams shown in FIGS. 6, 7, 9, 10, 11, and 12.

4 The bidirectional data links 106, 114, and 128 and can for example comprise digital
5 subscriber lines (DSL), dedicated lines, or wireless links. The communication protocol stacks
6 used on the bidirectional data links 106, 114, and 128 preferably comprise Hypertext Transfer
7 Protocol HTTP, over Transfer Control Protocol (TCP), over Internet Protocol (IP).

8 FIG. 2 is a hardware schematic of the DVD player 112.

9 The DVD player comprises a user interface panel 202. The user interface panel includes
10 a remote signal receiver/decoder 204 for receiving a signal generated by the remote control 118
11 in response to a user actuating the remote info link button 124. The user interface panel further
12 comprises a player info link button 120.

13 A modem 208 is provided for interfacing with the second bidirectional data link 114. The
14 modem could be replaced by another type of network interface, such as an ethernet card. The
15 type of network interface depends on the type of Internet connection.

16 A DVD drive 206 is provided for reading DVD 110, 116. A DVD decoder 210 is
17 provided for decoding signals read by the DVD drive 206.

18 An audio/visual module is provided for driving output devices, e.g., a television, based
19 on decoded signals received from the DVD decoder 210.

20 A processor 218 is provided for controlling the function of the DVD player, and executing
21 software according the present invention which is discussed below with reference to flow charts
22 shown in FIGS. 5, 8, 13, 14.

23 A flash memory 216 is provided for storing software executed by the processor 218.
24 The flash memory 218 could be replaced by another type of memory medium, preferably a non
25 volatile memory medium such as EPROM, or EEPROM.

26 A Random Access Memory (RAM) 214 is provided as a work space for use by the
27 processor 218, in executing programs. The RAM 214 is a volatile memory which stores
28 information temporarily. The RAM can also be used to store information from a DVD's Cell
29 Playback Information Table (CBIT) while a DVD is being played. The intended use of this
30 information is for controlling the playing of a recording on the DVD 110, 116.

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1 The DVD decoder 210 and the processor 218 can in fact be partially or wholly integrated.
2 For example the Pantera line of chips manufactured by National Semiconductor of Santa Clara,
3 California combine the functions of the DVD decoder and the processor into one programmable
4 chip. Other components of the DVD player 112 could also be integrated. For example by using
5 Application Specific Integrated Circuits (ASIC).

6 The DVD drive 206, modem 208, DVD decoder 210, audio visual module 212, RAM
7 214, flash memory 216, processor 218, and user interface panel 202 including the info link button
8 120 are coupled by a DVD player signal bus 220.

9 FIG. 3 is a hardware schematic of the remote control 118 according to a preferred
10 embodiment of the invention.

11 Referring to FIG. 3, the remote control comprises a key board switch matrix 302
12 including a info link button 304.

13 A key board encoder 306 scans the key board switch matrix in order to detect depression
14 of a key, such as the info link button switch 304, and generates a signal identifying a depressed
15 key.

16 The keyboard encoder 306 is coupled to a remote control signal bus 308.

17 A processor 310 is also coupled to the remote control signal bus 308.

18 A ROM 312 is also coupled to the remote control signal bus 308.

19 A signaling device drive 314 is also coupled to the remote control signal bus 308.

20 The signaling device drive 314 is drivingly coupled to a signaling device 316.

21 In response to detecting depression of the info link button switch 304, the keyboard
22 encoder outputs a signal identifying the info link button switch. The signal identifying the info
23 link button switch is read by the processor 310. The processor 310 looks up a signal code
24 corresponding to the info link button 124 in ROM 312 and writes that signal to the signaling
25 device drive 314. The signaling device drive drives the signaling device 316 accordingly.

26 FIG. 4 is a representation of a graphical user interface (GUI) device for controlling the
27 playback of a DVD 110, 116 and for accepting user activation of a GUI info link button 402. In
28 addition to the info link GUI button 402, the GUI 400 comprises a number of other buttons for
29 controlling the playback of a DVD 110, 116, including a play button 404, a stop button 406, a
30 pause button 408, a fast forward button 410, a rewind button 412, a skip forward button 414, and
31 a skip backward button 416.

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1 The GUI 400 can be programmed in a variety of programming languages. Object oriented
2 programming languages such as C++, and Java provide built in classes for constructing GUI.
3 What is necessary for the invention is the info link GUI button 402 which can be used to accept
4 user input. Process carried out in response to a user activating the info link button 402 are
5 discussed below with reference to the flow diagrams.

6 The player info link button 120, and the remote info link button 124, and the info link
7 GUI button 402 are used to accept a user request to access Internet based information.

8 FIG. 5 is a flow diagram of a process 500 performed by DVD player software which can
9 be run by the microprocessor (not shown) of the client computer 102, or by the processor 218 of
10 the DVD player.

11 In process block 502 the DVD drive 206 is started in response to insertion of the DVD
12 116. In the case of the client computer 102, software to accomplish process block 502 can be low
13 level software embedded into the client computer's DVD drive.

14 In process block 504, disk navigation information, preferably the Cell Playback
15 Information Table (C-PBIT) is read from the DVD 116.

16 In process block 506 the disk navigation information, preferably the C-PBIT is written
17 to RAM 214.

18 In process block 508 a user's activation of an info link control 120, 304, 402, is detected.

19 In process block 510, a unique DVD signature for the for the DVD 110, 116 is calculated
20 based on the disk navigation information. Preferably the unique DVD signature is calculated
21 based on information extracted from the C-PBIT. The C-PBIT comprises the following items
22 of information for each of a plurality of cells that comprise a DVD recording on the DVD 110,
23 116: Cell Playback Time (C-PBTM), Cell First Video Object Unit Start Address
24 (C_FVOBU_SA), Cell Last Video Object Unit Start Address (C_LVOBU_SA), and
25 Interleave Unit (ILU). The C-PBIT and other navigation information record on DVD is defined
26 in the "DVD specifications for Read-Only Disc" published by the DVD consortium.

27 Information from the C-PBIT is preferred because it is usually read out of DVD 110, 116
28 and stored in RAM 214 at the commencement of playback of the DVD 110, 116. Therefore, it
29 would be unnecessary to stop playback of the recording in order to read specific information from
30 the DVD 110, 116 in order to calculate a unique DVD signature. On the other hand, according
31 to one embodiment of the invention, whatever information whether it be from the C_PBIT or

1 other navigation information can be read out of the DVD and stored in RAM 214 before a
2 playback begins so that it can be read at any time during playback, in response to the user's
3 activation of the info link control, without interrupting the playback.

4 Note that the order of process blocks 508 and 510 can be reversed. That is the DVD
5 signature can be generated in anticipation of the user activating the info link control 120, 304,
6 402. If process blocks 508 and 510 were reversed, it would be appropriate to store the DVD
7 signature in RAM 214. Storing the DVD signature in RAM would also obviate the necessity to
8 interrupt playback in order to move a read head (not shown) in the DVD drive 206 in order to
9 read information, preferably the C_PBIT, from which the DVD signature is calculated. In fact
10 storing the signature, as opposed to storing the navigation information from which it is
11 calculated, has the advantage of reducing a response time to the user's activation of the info link
12 control, because the calculation steps which take a certain amount of time will already have been
13 performed. The DVD signature would then be read out of memory in response to detecting
14 activation of the player info link button 120, the remote info link button 124, or the info link GUI
15 button 402.

16 Other possible variations on process 500 and other processes discussed herein will be
17 apparent to persons skilled in the programming art.

18 In process block 512 the DVD signature is formatted as clear text. Preferably, the the
19 unique DVD signature calculated in process block 510 is an integer.

20 The process 500 can include an optional process block between 510 and 512 to encrypt
21 the DVD signature in order to protect the privacy of messages including the DVD signature.
22 Encryption could be asymmetric encryption using public and private keys. However, encryption
23 may be unnecessary as long as details of the calculation performed in process block 506 are
24 maintained in secrecy.

25 In process block 514 a user is prompted to decide whether they wish to receive
26 promotional information related to the recording on the DVD 110, 116. Process block 514 can
27 be accomplished by a GUI screen comprising a message which solicits the user to elect to receive
28 promotional information, and provides "YES" and "NO" GUI buttons for accepting the user's
29 decision.

30 Process block 516 is a decision block, the outcome of which depends on whether the user
31 elects to receive promotional information. If the user elects to receive promotional information,

1 then the process 500 continues with process block 518 in which the DVD signature, and a user
2 ID, preferably and email address, is appended to a URL which points to the DVD information
3 server 126. The conventions of HTTP for appending data to a URL can be used. According to
4 those conventions, each value is preceded by a name and equal sign, and successive name=value
5 strings are separated by ampersand characters. After process block 518 the process 500 continues
6 with process block 522.

7 If the user elects not to receive promotional information then the process 500 continues
8 with process block 520 in which the DVD signature is appended to a URL pointing to the DVD
9 information server.

10 Providing for user input in 514 rather than automatically transmitting a user ID serves the
11 purpose of protecting the user's privacy.

12 In process block 522, a web client is instantiated. The web client can be a separate web
13 browser called by the DVD software. A web client such as the Planetweb browser sold by
14 Planetweb Inc. company, of Redwood, California can be used as the web browser for the DVD
15 player 112. A web client such as Netscape Navigator sold by America Online of Dulles, Virginia
16 can be used for the client computer 102. In either case the web client can be started and made
17 to access a particular URL by controlling it from the DVD player software, through it's API. The
18 details of each web clients API are made available to software developers.

19 In process block 524, an HTTP GET request with the URL with appended data is sent
20 through the web client to the DVD information server 126.

21 Software residing on the DVD information server can comprise a CGI scripts for parsing
22 the URL with appended data. Aspects of DVD information server software are described below
23 with reference to flowcharts shown in FIGS. 6, 7, 9, 10, 11, 12.

24 In process block 526 a web page relating to a specific DVD 110, identified by the DVD
25 signature is received in response to the HTTP GET request issued in process block 524.

26 Although process 500 has been discussed in terms of HTTP, the invention can be used
27 in connection with other existing and future communication protocols. Accordingly the message
28 sent in process block 520 need not be based on a URL (an HTTP token) rather it can be formatted
29 according to other communication protocols.

30 FIG. 6 is a flow diagram of a process 600 performed by the DVD information server 126.

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1 In process block 602 a DVD signature is received from a DVD client device 102, 112 via
2 the Internet 104.

3 In process block 604 a the DVD signature is used as a key to locate a record in a database
4 containing one or more URL's related to a DVD identified by the DVD signature.

5 In process block 606 the one or more URL's located in process block 604 are transmitted
6 back to the DVD client device, 102, 112.

7 FIG. 7 is a flow diagram of a process 700 performed by the DVD information server 126
8 in response to receiving the message sent in process block 520.

9 In process block 702 data including the DVD signature, and possibly including a user ID
10 is received from a client device 102, 112. The user ID preferably comprises an email address.

11 In process block 704 the DVD signature is used as a database key to locate a record
12 containing a plurality of URL's associated with a disk identified by the DVD signature.

13 In process block 706, a web page is generated which contains hyperlinks corresponding
14 to the plurality of URL's. Note that the web page could also embed an video (MPEG) preview
15 of an another film. The web page can comprise among other things hyperlinks to a plurality of
16 web based resources related to a film or other DVD content identified by the DVD signature.
17 Such web based content can include but is not limited to online stores selling film related
18 memorabilia, chatrooms with film specific topics, web based discussion forums for discussing
19 specific films, and web forms for accepting user feedback on specific films.

20 In process block 708 the web page generated in the preceding process block is transmitted
21 to the client device 102, 112.

22 In process block 710, a database of statistical information related to the viewing of
23 specific DVD titles is updated. The update can, for example, increment a count of viewers
24 viewing the DVD disk 110, 116 identified by the DVD signature. The time could also be logged
25 for the purpose of logging information of viewing habits. The IP address of from which the DVD
26 signature was received can be recorded. The latter can be correlated to a geographic area for the
27 purpose of collecting geographic marking information. In the forgoing manner statistical
28 information analogous to that gathered by the Nielsen rating service for television programming
29 can be developed.

30 Process block 712 is a decision block, in which it is ascertained if a user ID has been
31 received. If not then the process 700 terminates.

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1 If a user ID has been received, then the process continues with process block 714, in
2 which the user ID is stored in a record associated with a DVD title corresponding to the DVD
3 signature in an advertising database.

4 Process block 716 is a delay period during which a new opportunity for targeted
5 advertising related to a DVD identified by the DVD signature arises.

6 In process block 718 a user, identified by user ID (e.g., email) which was stored in the
7 record associated with the DVD signature is sent an advertising message. For example, the
8 message can comprise notice of the upcoming release of a sequel to the DVD identified by the
9 DVD signature.

10 FIG. 8 is a flow diagram of a process 800 performed by a client device 102, 112 according
11 to a preferred embodiment of the invention.

12 In process block 802 a user's activation of an info link button 120, 304, 402 is detected.

13 In process block 804, in response to detecting the user's activation of the info link button,
14 DVD navigation information, preferably, the C-PBIT is read, preferably, from RAM 214,
15 alternatively from the DVD 110, 116.

16 In process block 806 a unique DVD signature for the DVD is calculated based on the
17 DVD navigation information, preferable the C-PBIT.

18 In process block 808 the unique DVD signature is used to search for a record
19 corresponding to the DVD 110, 116 in a local database stored in the client device 102, 112.
20 In the case of client computer 102, the local database can be stored in the hard drive. In the case
21 of the DVD player 112 the local database can be stored in the flash memory 219 or in additional
22 memory for example a hard drive (not shown).

23 Process block 810 is a decision block, the outcome of which depends on whether or not
24 a record was found in process block 808. If a record was found then the in process block 812
25 information from the record is displayed to the user, after which the process 800 terminates.

26 If a record was not found, then the process continues with process block 814, in which
27 the user is prompted to decide whether to update the local database from the DVD information
28 server 126. Process block 816 is a decision block which depends on user input in response to
29 process block 814. If the user decides not to update then the process 800 terminates. If the user
30 decides to update, then in process block 818 a request to receive a database update is transmitted

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1 to the DVD information server, and in process block 820 the database update is received. The
2 process 800 then loops back to process block 808.

3 FIG. 9 is a flow chart of a process 900 performed by the DVD information server 126 in
4 response a request transmitted in process block 818.

5 In process block 902 a request for a database update is received from a DVD client device
6 102, 112.

7 In process block 904 an updated database is transmitted to the DVD client device 102,
8 112. The updated database preferably comprises a plurality of records each including a URL
9 field and a DVD signature key field.

10 FIG. 10 is a flow chart of a process 1000 performed by the DVD information server 126
11 in response to receiving a DVD signature from a DVD client 102, 112.

12 In process block 1002 the DVD signature is received.

13 In process block 1004 the DVD signature is used as a key to locate a record corresponding
14 to the disk 116 from which the DVD signature was derived.

15 In process block 1006 descriptive information pertaining to the disk 110,116 is read from
16 the record. The descriptive information may for example comprise the title of the DVD 110, 116.

17 In process block 1008 a web site of an E-commerce affiliate of the DVD information
18 server operator is accessed. For example, the operator of the DVD information server might have
19 an E-commerce affiliate that sells books including books on films, or film memorabilia.

20 In process block 1010 a search is executed in a database on the E-commerce affiliates web
21 site using the descriptive information from the record in a search string.

22 In process block 1012 a web page containing the results of the search is generated.

23 Alternatively, the E-commerce affiliates may provide URLs to their web sites that are
24 related to the descriptive information in the record. All the URLs may be transmitted back to the
25 DVD client device 102, 112 in the form of a web page.

26 In process block 1014 the web page is transmitted to the DVD client device 102, 112 for
27 which the DVD signature was received in process block 1002.

28 FIG. 11 is a flow chart of a process 1100 performed by the DVD information server 126
29 in response to receiving a DVD signature from a DVD client 102, 112.

30 In process block 1102, the DVD signature is received from a DVD client device 102, 112.

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1 In process block 1104 a DVD information database is searched for a record corresponding
2 to the DVD signature.

3 Process block 1106 is a decision block, the outcome of which depends on whether a
4 record was found in process block 1104. If a record was found, then in process block 1108
5 information (e.g., a URL) read from the record is sent to the client 102, 112.

6 If a record was not found, then the process continues with process block 1110 in which
7 a request for title information is sent to the the client device 102,112.

8 In process block 1112 title information is received from the client 102, 112.

9 The client device 102, 112 would be provided with a software routine that receives such
10 requests, reads the title information either directly from the DVD 116 or from RAM 214, and
11 sends the title information to the requesting DVD information receiver 126.

12 Alternatively, the client device 102, 112 would prompt the user to input title information
13 upon receipt of the request for title information.

14 In process block 1114 the DVD information database is searched for a record with
15 matching title information. The title information need not correspond precisely to a title printed
16 on the DVD 116, rather, it is the information contained in the primary volume descriptor
17 recorded on the DVD 116.

18 Process block 1116 is a decision block, the outcome of which depends on whether a
19 matching record was found in process block 1114. If a matching record was not found, then in
20 process block 1118 the title information received in process block 1112, and the DVD signature
21 received in process block 1102 is stored in a first temporary database. The operator of the DVD
22 information server 126, can read the content of the first temporary database to obtain a list of
23 DVD titles that are not currently included in the DVD information database. Having this
24 information, the operator could then approach the producer of the DVD, with evidence of interest
25 on the part of purchasers of the DVD titles in question, in the services of the DVD information
26 server.

27 If it is determined in process block 1116 that the a record matching the title information
28 was found in process block 1114, then the process continues with process block 1202 (FIG. 12),
29 in which a record of the title information and DVD signature is entered into a second temporary
30 database.

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1 In process block 1204 the record found in process block 1114 is checked to determine if
2 a "DVD signature list complete" field is checked. Each record in the DVD information database
3 corresponding to a single DVD title, can comprise more than one valid DVD signature. More
4 than one signature is called for because multiple DVDs of the same title are produced separately
5 for specific regional markets and the different would have different disk signatures. Moreover
6 for a given market different versions e.g. a directors cut, or a collectors version, with additional
7 recordings may be released on different dates. The DVD signature list complete field is checked
8 for a given DVD title when information is received from a producer indicating that no more
9 releases are forthcoming.

10 Process block 1206 is a decision block, the outcome of which depends on whether the
11 "DVD signature list complete" is found to have been checked. If not then in process block 1212
12 information, e.g. a web page comprising a URL from the record located in process block 1114
13 is transmitted to the DVD client device 102, 112.

14 If the "DVD signature list complete" field was checked, then in process block 1208 a
15 message indicating that the disk is a pirated disk is sent the DVD client device 102, 112.

16 The DVD player 112 can be provided with a software module for disabling playback of
17 the DVD disk 116 in response to receiving the pirated disk message.

18 In process block 1210, the DVD signature is stored in an illegal disk database. Entries
19 from the illegal disk database can be provided to producers of corresponding authentic DVDs.

20 FIG. 13 is a flow chart of a first process 1300 for calculating a DVD signature based on
21 information read from a DVD C-PBIT.

22 In process block 1302 a counter, N is initialized to zero.

23 In process block 1304 a sum is initialized to zero.

24 In process block 1306, for the Nth cell (starting with N=1) of a DVD the Cell Playback
25 Time (C-PBTM) value is bit shifted by four bytes to the right to obtain an eight byte long shifted
26 C-PBTM.

27 In process block 1308 for the Nth cell the shifted C-PBTM is combined through a boolean
28 OR operation with the Cell First Video Object Unit Start Address (C-FVOBU-SA) to obtain a
29 cell sum.

30 In process block 1310 the cell sum is added to the sum.

31 In process block 1312 the counter N is incremented.

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1 In process block 1314 the counter is compared to a count maximum NMAX. If the
2 counter N is less than the count maximum NMAX then the process 1300 loops back to process
3 block 1306. If the NMAX is not less than the count maximum NMAX, then the process
4 continues with process block 1316 in which the digital DVD signature is set equal to the sum.

5 FIG. 14 is a flow chart of a second process 1400 for calculating a DVD signature based
6 on information read from a DVD C-PBIT.

7 In process block 1402 a counter, N is initialized to zero.

8 In process block 1404 a sum is initialized to zero.

9 In process block 1406, for the Nth cell (starting with N=1) of a DVD the Cell Playback
10 Time (C-PBTM) value is bit shifted by four bytes to the right to obtain an eight byte long shifted
11 C-PBTM.

12 In process block 1408 for the Nth cell the Cell First Video Object Unit Start Address (C-
13 FVOBU-SA) is subtracted from the Cell Last Video Object Unit Start Address (C-LVOBU-SA)
14 to obtain a cell difference.

15 In process block 1410 the the shifted C-PBTM is combined through a boolean OR
16 operation with the cell difference to obtain a cell value.

17 In process block 1412 the cell value is added to the sum.

18 In process block 1414 the counter N is incremented.

19 In process block 1316 the counter is compared to a count maximum NMAX. If the
20 counter N is less than the count maximum NMAX then the process 1400 loops back to process
21 block 1406. If the NMAX is not less than the count maximum NMAX, then the process
22 continues with process block 1418 in which the digital DVD signature is set equal to the sum.
23 NMAX is preferably equal to an integer between 5 and 99. More preferably NMAX is equal to
24 an integer between 20 and 99.

25 A myriad of possible calculations including but not limited to other calculations based
26 on boolean and arithmetic operations on navigation data, preferably C-PBIT data are possible.

27 The invention provides for integration of the high bandwidth capability of a local DVD
28 client device which affords high quality video among other advantages, with the flexibility for
29 E-commerce exploitation provided by Internet connectivity.

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The invention teaches a method for calculating a DVD signature, which does not place a high computational burden on a DVD player, and does not necessitate interruption of DVD disk playback.

The DVD signature serves as a nexus between a specific DVD an Internet based content related to the specific DVD.

Industrial Applicability

The present invention is useful with respect to DVD entertainment systems and software relative thereto.

What is claimed is:

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Claims

1. A DVD player comprising:
 - a DVD drive for reading navigation data from a DVD;
 - a processor for calculating a DVD signature from the navigation data; and
 - a network interface for transmitting the DVD signature and receiving information related to the DVD.
2. The DVD player according to claim 1 wherein the DVD drive comprises a DVD drive for reading information from a C-PBIT from the DVD and the processor comprises a processor for calculating a DVD signature from the information from the C-PBIT.
3. The DVD player according to claim 2 further comprising a memory for storing the navigation information.
4. The DVD player according to claim 2 further comprising a memory for storing the DVD signature.
5. The DVD player according to claim 3 further comprising a control for accepting a user's request to access Internet based information.
6. The DVD player according to claim 4 further comprising a control for accepting a user's request to access Internet based information.
7. The DVD player according to claim 3 further comprising a remote signal receiver decoder for receiving a signal generated by a remote control in response to a user actuating a remote control.
8. The DVD player according to claim 4 further comprising a remote signal receiver decoder for receiving a signal generated by a remote control in response to a user actuating a remote control.
9. A method for operating a DVD client device comprising steps of:
 - reading navigation information from a DVD;
 - calculating a DVD signature from the navigation information;
 - detecting user activation of a control; and
 - transmitting the DVD signature to a DVD information server in response to detecting user activation of the control.
10. The method according to claim 9 further comprising a step of transmitting a user ID to the to the DVD information server.

1 11. The method according to claim 9 further comprising steps of accepting a user
2 decision to receive promotional information and transmitting a user ID to the DVD information
3 server.

4 12. The method according to claim 9 further comprising a step of instantiating a web
5 browser.

6 13. The method according to claim 9 wherein the step of transmitting the DVD
7 signature comprises the step of:

8 transmitting an HTTP GET request comprising a URL with the DVD signature appended
9 to the URL to the DVD information server in response to detecting user activation of the control;
10 detecting user activation of an info link control; and

11 transmitting the DVD signature to a DVD information server in response to detecting user
12 activation of the info link control.

13 14. The method of claim 9 wherein the step of reading navigation information
14 comprises the sub step of reading a cell playback information table from the DVD.

15 15. The method of claim 9 wherein the step of calculating a DVD signature comprises
16 the sub step of calculating a DVD signature based on information read from the cell playback
17 information table.

18 16. The method of claim 9 wherein the step of calculating a DVD signature based on
19 information read from the cell playback information table comprises the sub steps of:

20 initializing a counter;

21 initializing a sum;

22 for each of a plurality of cells, performing the sub-steps of:

23 bit shifting a cell playback time variable by four bytes to obtain a shifted cell
24 playback time variable;

25 combining the shifted cell playback time variable with a cell first video object
26 unit start address using a boolean OR operation to obtain a cell number; and

27 adding the cell number to a sum; and

28 setting the DVD signature equal to the sum.

29 17. The method of claim 9 wherein the step of calculating a DVD signature based on
30 information read from the cell playback information table comprises the sub steps of:

31 initializing a counter;

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1 initializing a sum;

2 for each of a plurality of cells performing the sub-steps of:

3 bit shifting a cell playback time variable by four bytes to obtain a shifted cell
4 playback time variable;

5 subtracting a cell first video object unit start address from a cell last video object
6 unit start address to obtain a cell difference;

7 combining the shifted cell playback time variable with the cell difference using
8 a boolean OR operation to obtain a cell number; and

9 adding the cell number to a sum; and

10 setting the DVD signature equal to the sum.

11 18. A method of operating a DVD client device comprising the steps of:

12 detecting a user activation of a control;

13 reading navigation data;

14 calculating a DVD signature for a DVD based on the navigation data; and

15 using the DVD signature to search for a record corresponding to the DVD signature in
16 a database stored in the client device.

17 19. The method according to claim 18 further comprising the steps of:

18 prompting a user to decide whether to update the database;

19 in the case that the user decides to update the database, transmitting a request to receive
20 a database update to a DVD information server; and
21 receiving the database update.

22 20. A method for operating a DVD information server comprising the steps of:

23 receiving a DVD signature, calculated from navigational data of a DVD, from a DVD
24 client device;

25 using the DVD signature as a database key to locate a record containing one or more
26 URL's related to the DVD; and

27 transmitting the one or more URL's related to the DVD to the DVD client device.

28 21. A method for operating a DVD information server comprising the steps of:

29 receiving a request for a database update from a DVD client device; and

30 transmitting an updated database including records, each record including a URL field
31 and a DVD signature key field, to the DVD client device.

1 22. A method for operating a DVD information server comprising the steps of:
2 receiving a DVD signature from a DVD client device;
3 using the DVD signature as a database key to locate a record corresponding to the DVD
4 signature;
5 reading descriptive information from the record; and
6 executing a search in an affiliates database.

7 23. A method for operating a DVD information server comprising the steps of:
8 receiving a DVD signature from a DVD client device;
9 receiving title information from the DVD client device;
10 determining whether a database contains a record corresponding to the DVD signature;
11 determining whether the database contains a record corresponding to the title information;
12 and
13 in the case that the database does not contain a record corresponding to the DVD
14 signature, and does not contain a record corresponding to the title information, recording the title
15 information and DVD signature in a temporary database.

16 24. The method according to claim 23 further comprising the step of determining that
17 a field that indicates that a list of signatures corresponding to the title information in the database
18 is complete.

19 25. The method according to claim 24 further comprising the step of recording the
20 DVD signature in a database of illegal signatures.

21 26. The method according to claim 24 further comprising the step of sending a pirated
22 disk message to the DVD client device.

23 27. A computer readable medium containing programming instructions for operating
24 a DVD client device including programming instructions for:

25 reading navigation information from a DVD;
26 calculating a DVD signature from the navigation information;
27 detecting user activation of a control; and
28 transmitting the DVD signature to a DVD information server in response to detecting user
29 activation of the control.

30 28. The computer readable medium according to claim 27 further comprising
31 programming instructions for transmitting a user ID to the to the DVD information server.

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1 29. The computer readable medium according to claim 27 further comprising
2 programming instructions for accepting a user decision to receive promotional information and
3 transmitting a user ID to the DVD information server.

4 30. The computer readable medium according to claim 27 wherein the programming
5 instructions for reading navigation information comprises programming instructions for reading
6 a cell playback information table from the DVD.

7 31. The computer readable medium of claim 27 wherein the programming instructions
8 for calculating a DVD signature comprise programming instructions for:

9 calculating a DVD signature based on information read from the cell playback
10 information table;

11 detecting user activation of a control; and

12 transmitting the DVD signature to a DVD information server in response to detecting user
13 activation of an info link control.

14 32. A method of operating a DVD player comprising, a DVD drive, a memory; a
15 processor; and a network interface comprising the steps of:

16 reading navigation information from a DVD;

17 calculating a DVD signature from the navigation information;

18 storing the DVD signature in the memory;

19 detecting user activation of a control; and

20 in response to detecting user activation of the control, reading the DVD signature from
21 memory; and

22 transmitting the DVD signature to a DVD information server in response to detecting user
23 activation of the control.

24 33. The method according to claim 32 wherein the step of transmitting the DVD
25 signature comprises a sub step of transmitting the DVD signature to a DVD information server
26 in response to detecting user activation of an info link control.

27 34. A method of operating a DVD player comprising, a DVD drive, a memory; a
28 processor; and a network interface comprising the steps of:

29 reading navigation information from a DVD;

30 storing the navigation information in the memory

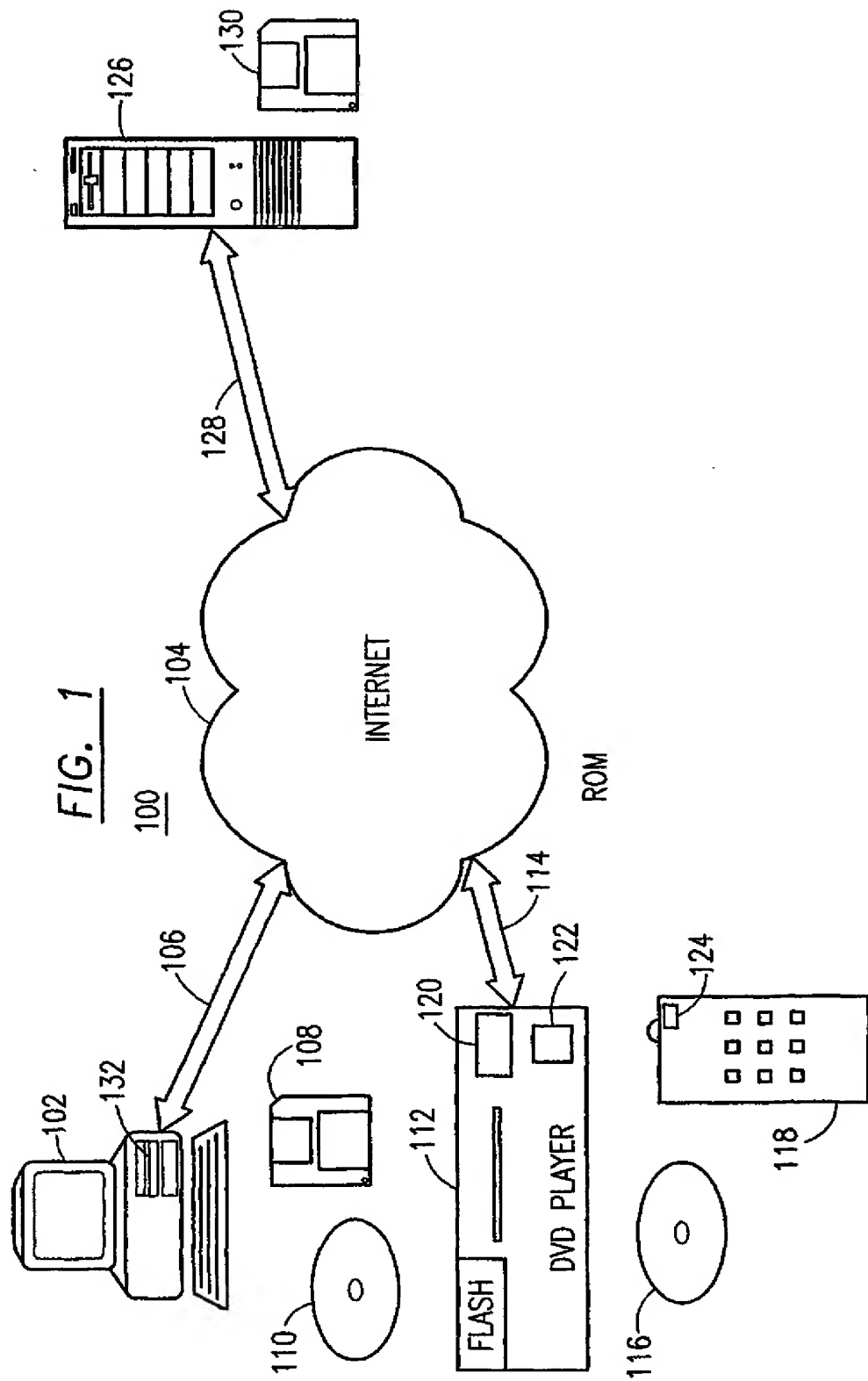
31 detecting user activation of a control

-22-

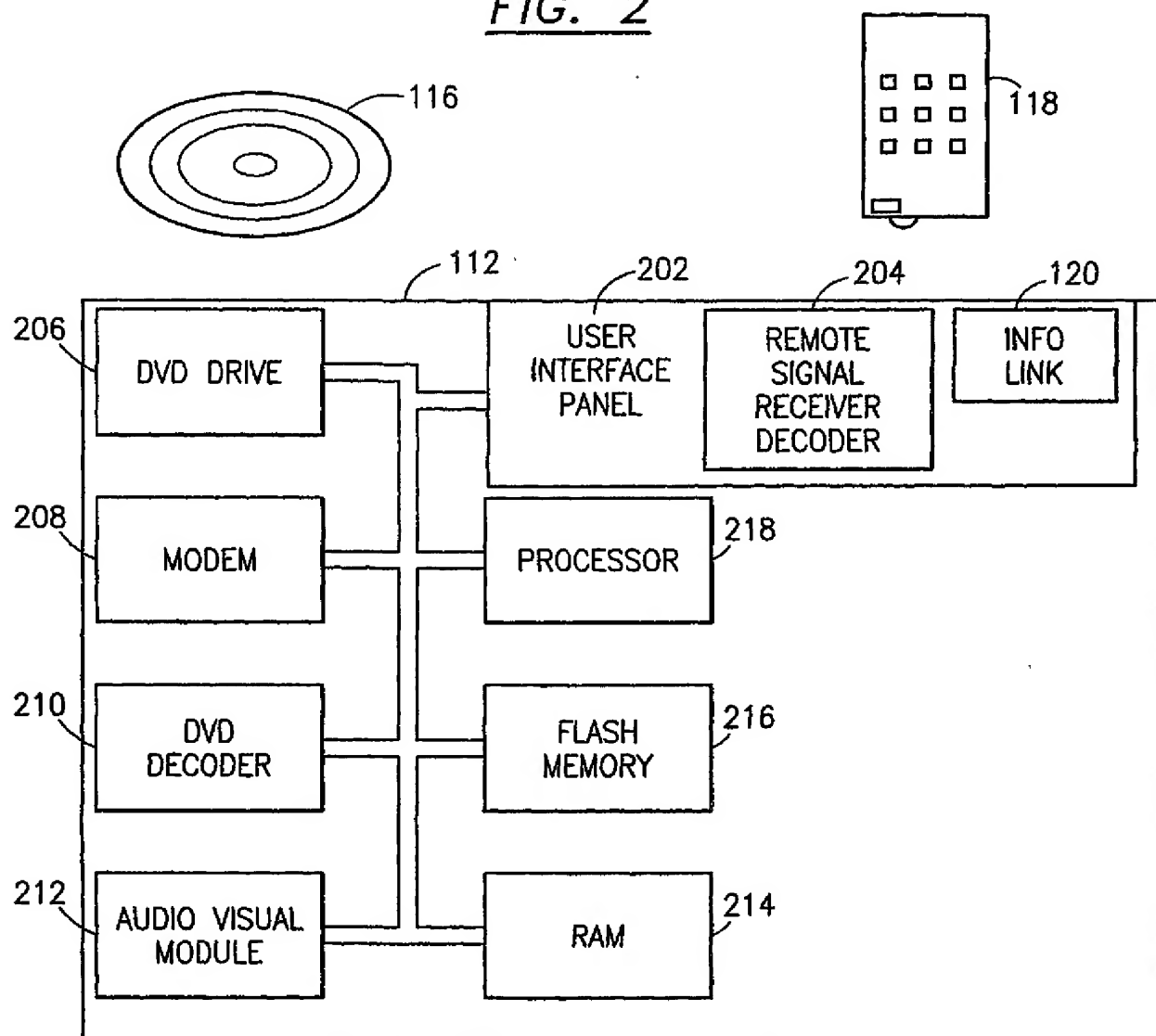
1 in response to detecting user activation of the control, calculating a DVD signature from
2 the navigation information;

3 transmitting the DVD signature to a DVD information server in response to detecting user
4 activation of the control.

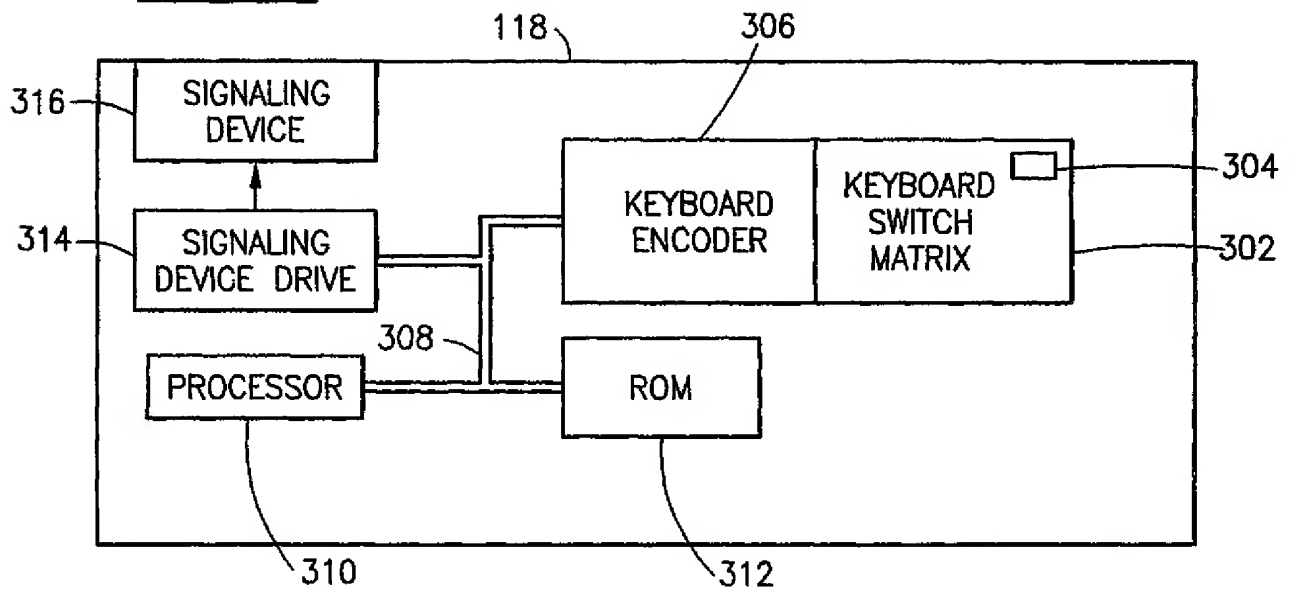
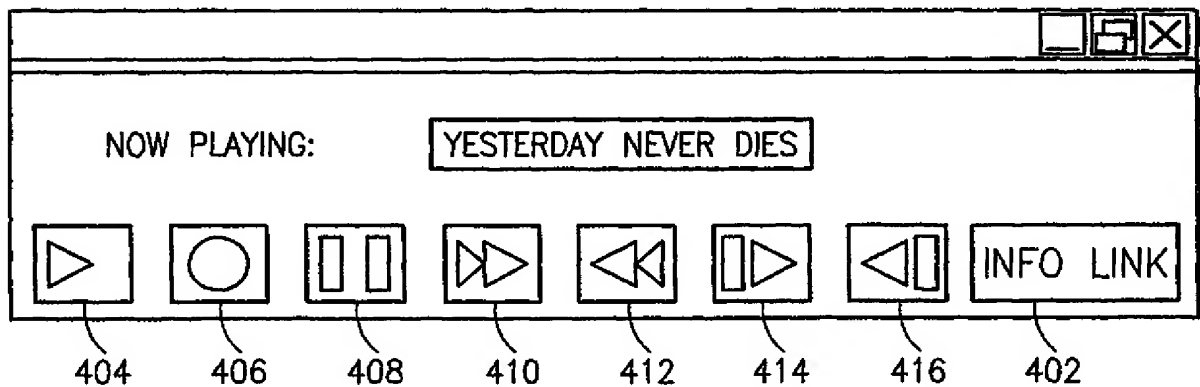
5 35. The method according to claim 34 wherein the step of transmitting the DVD
6 signature comprises a sub step of transmitting the DVD signature to a DVD information server
7 in response to detecting user activation of an info link control.



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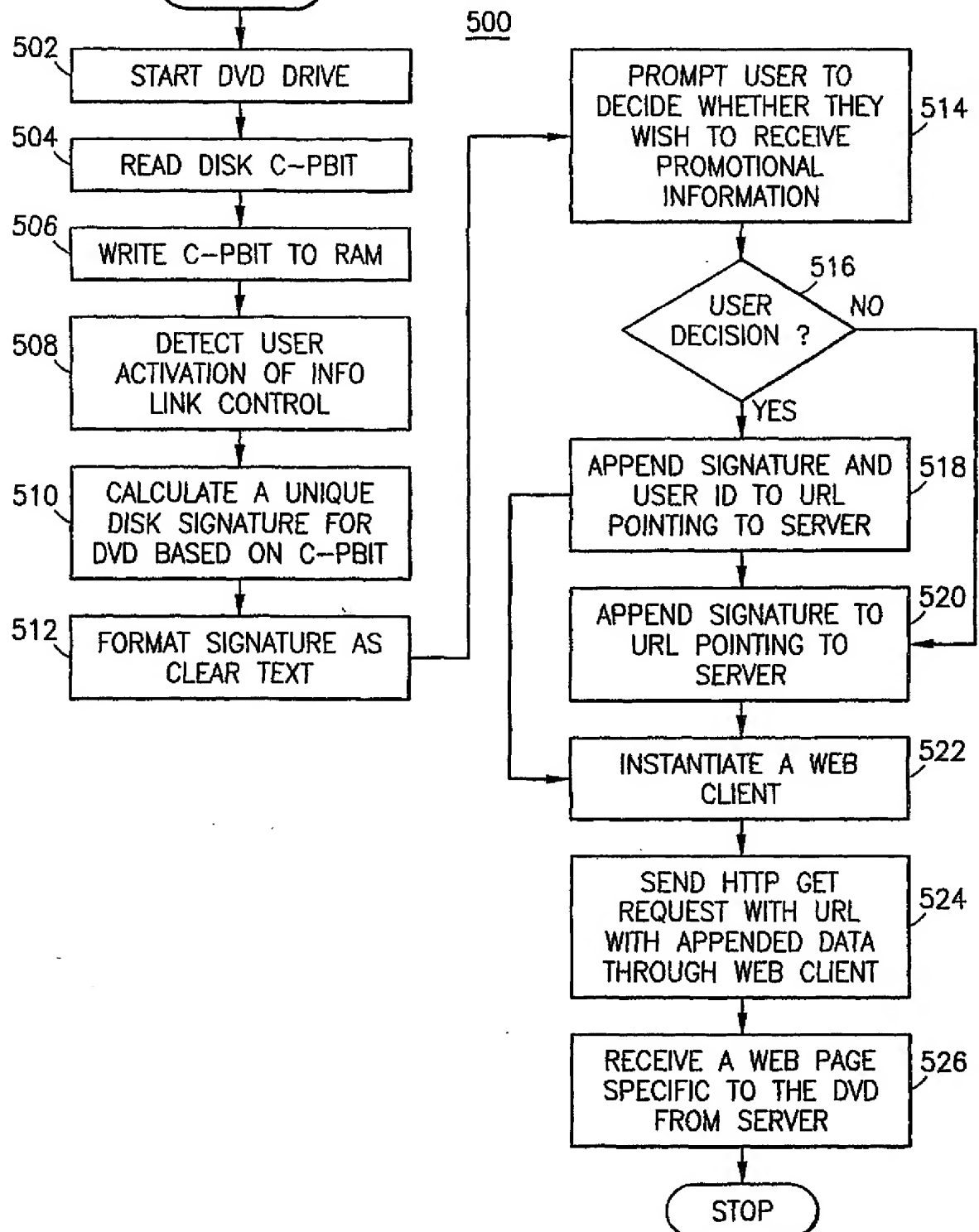
FIG. 2

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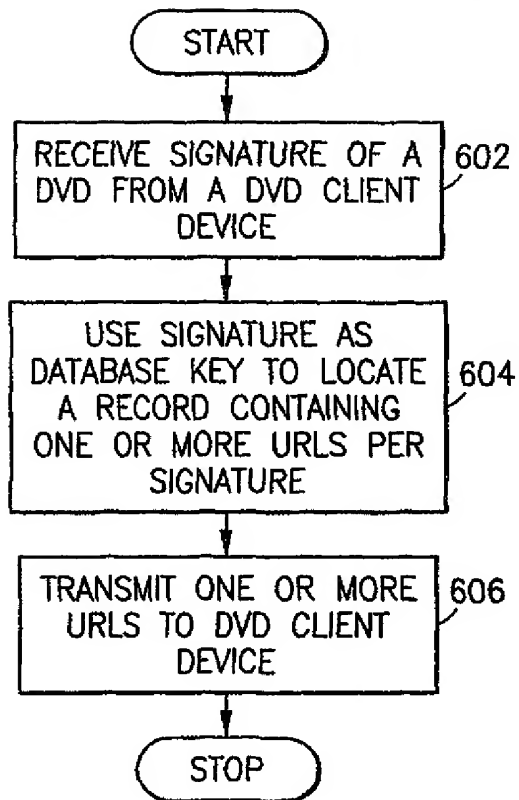
FIG. 3FIG. 4400

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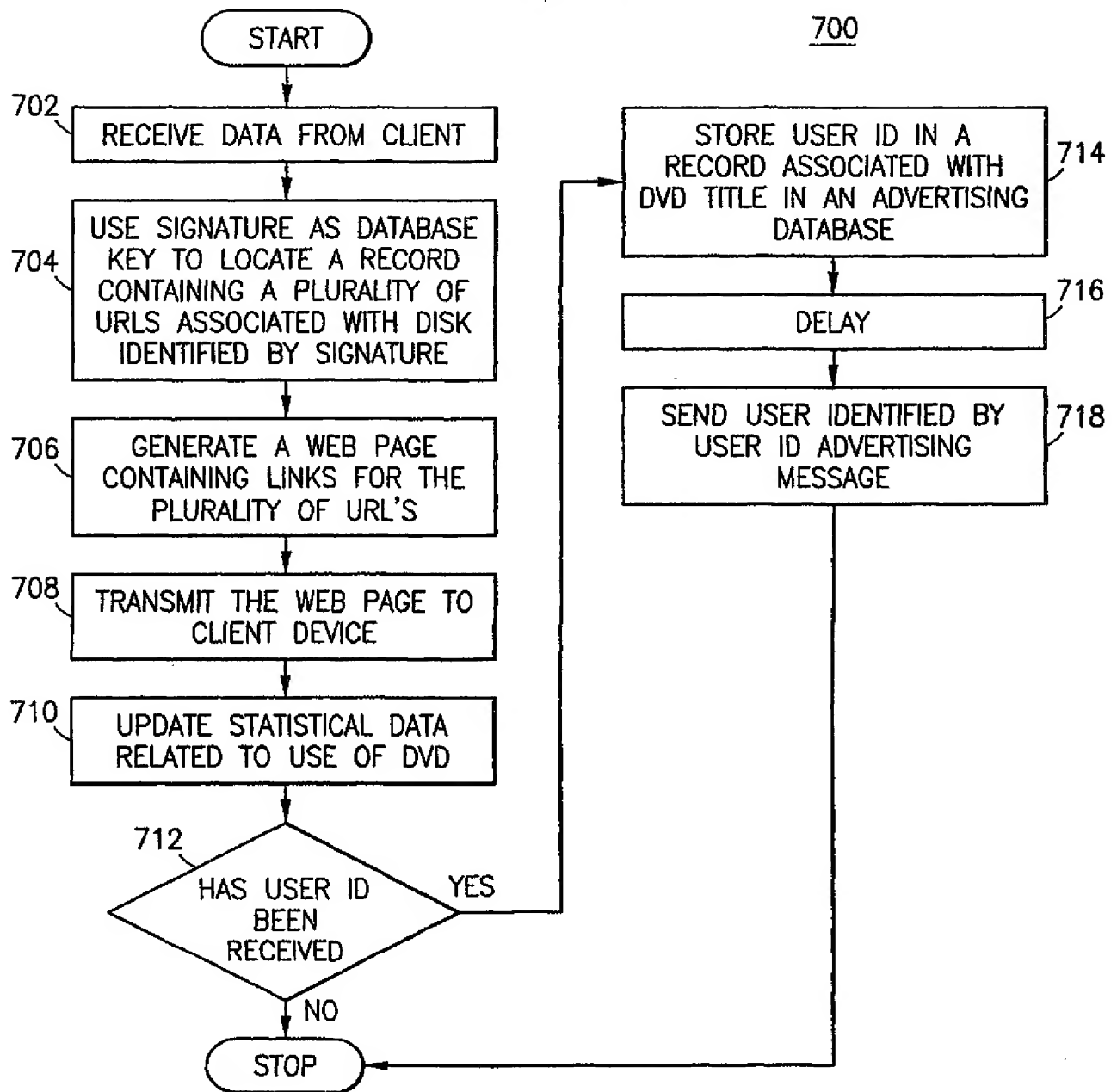
FIG. 5



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FIG. 6600

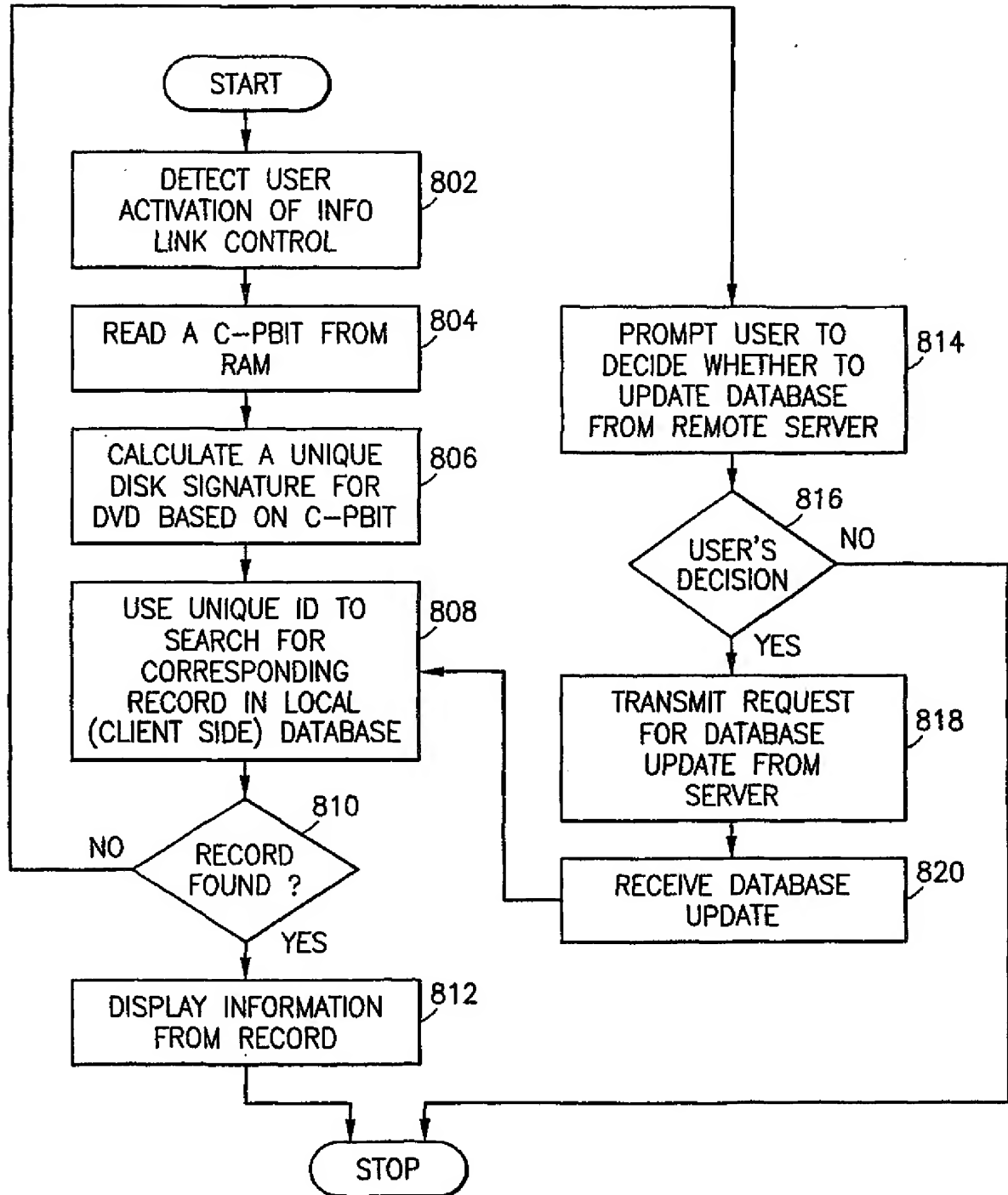
6/13

FIG. 7

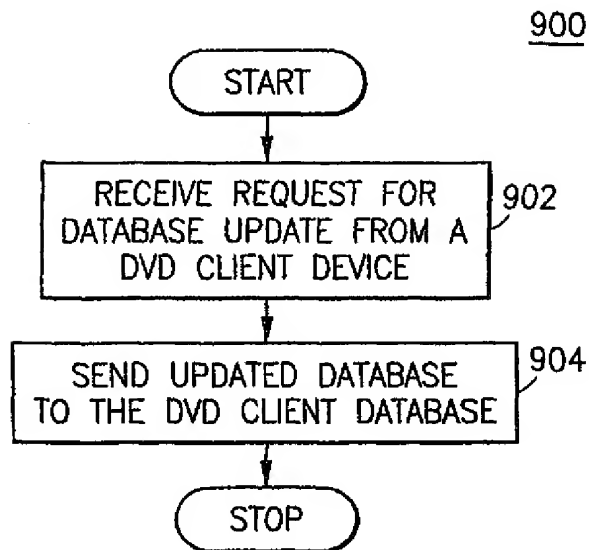
7/13

FIG. 8

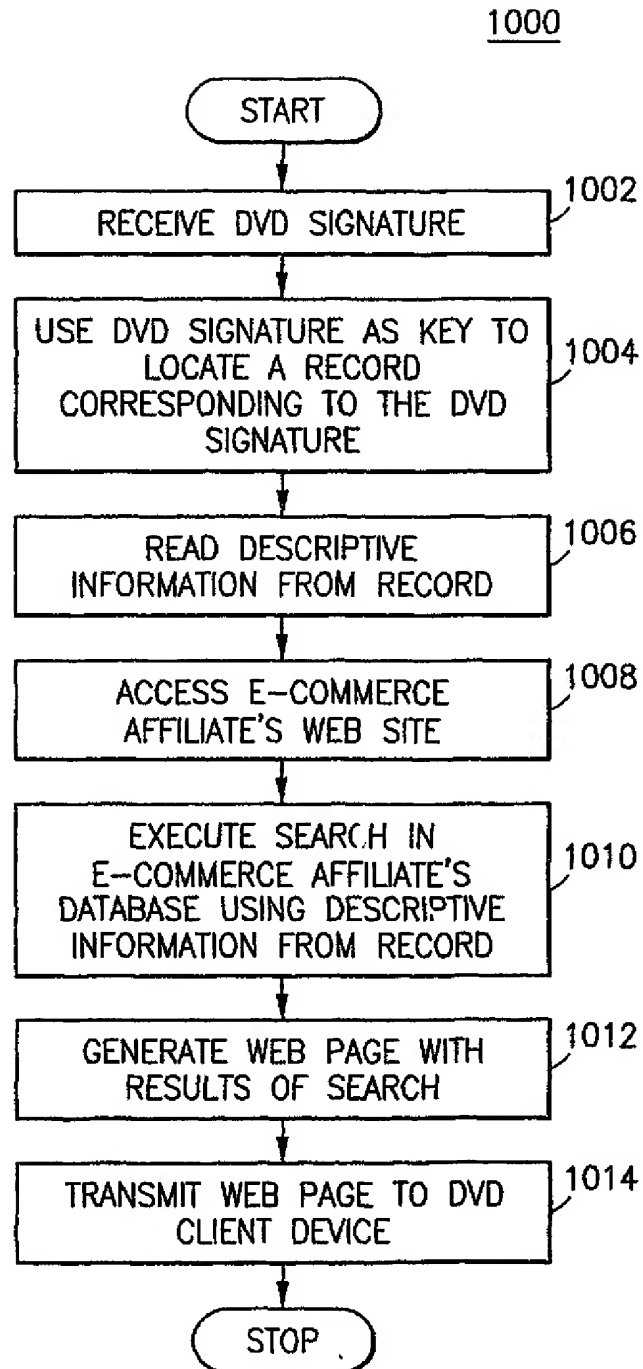
800



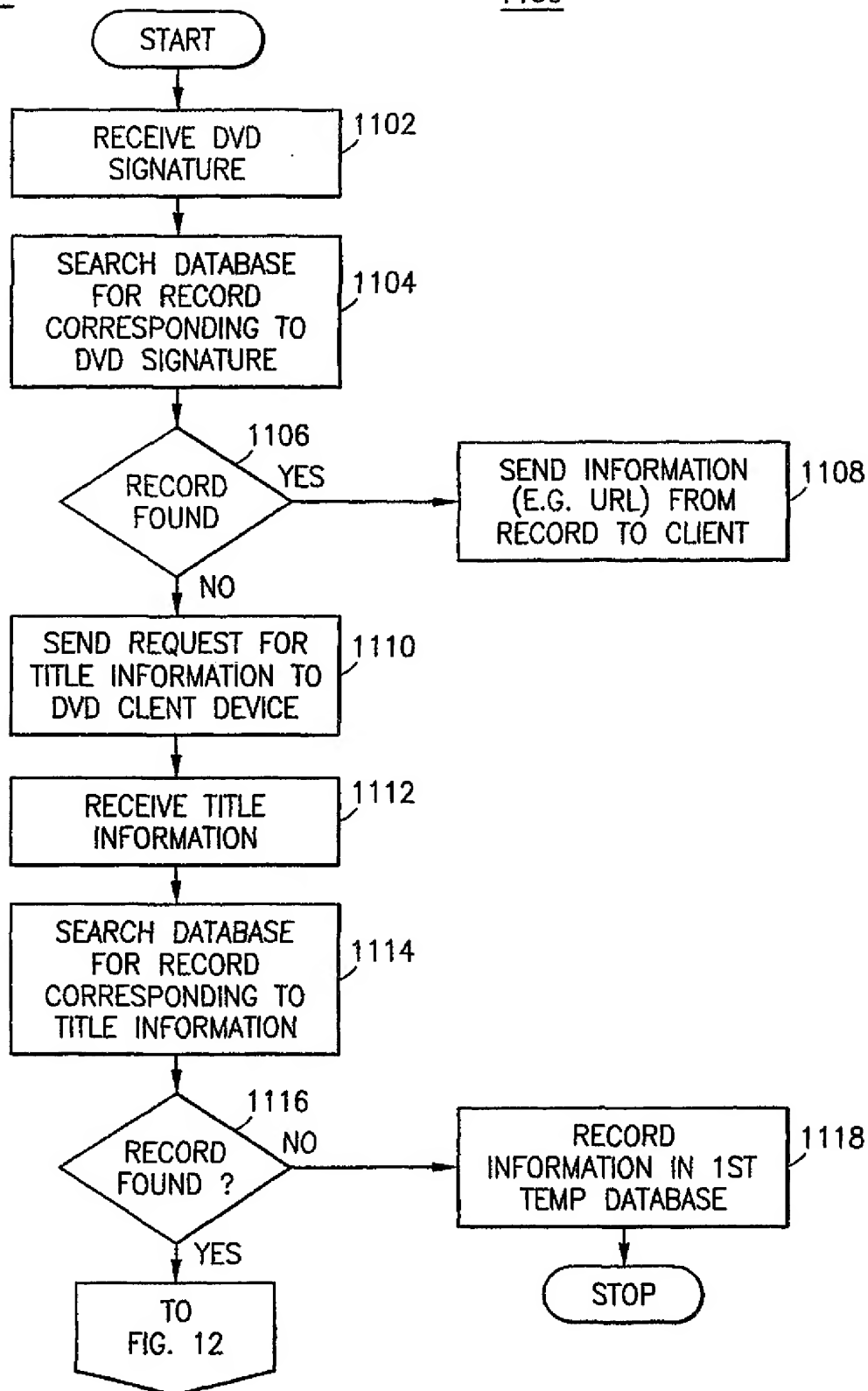
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FIG. 9

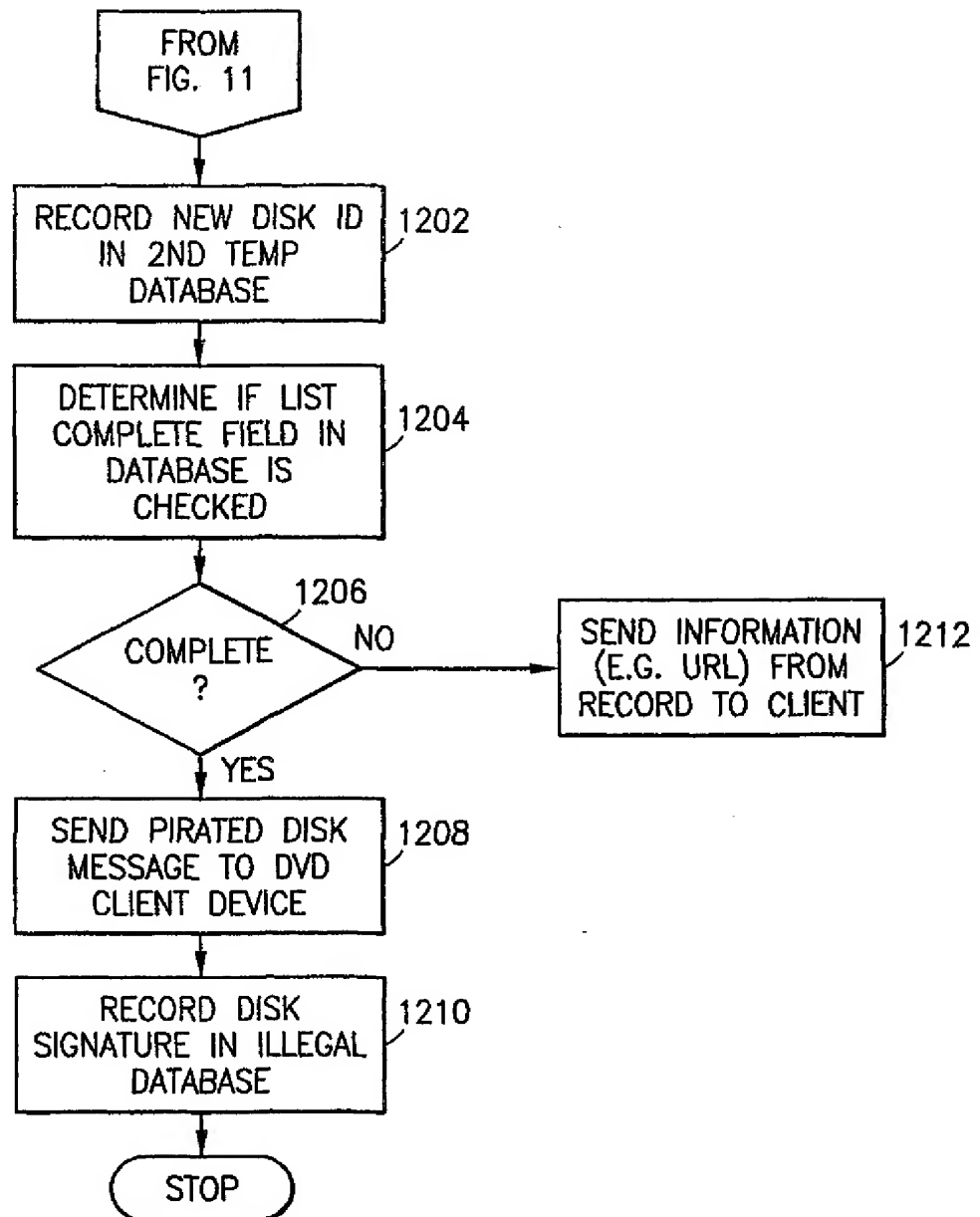
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FIG. 10

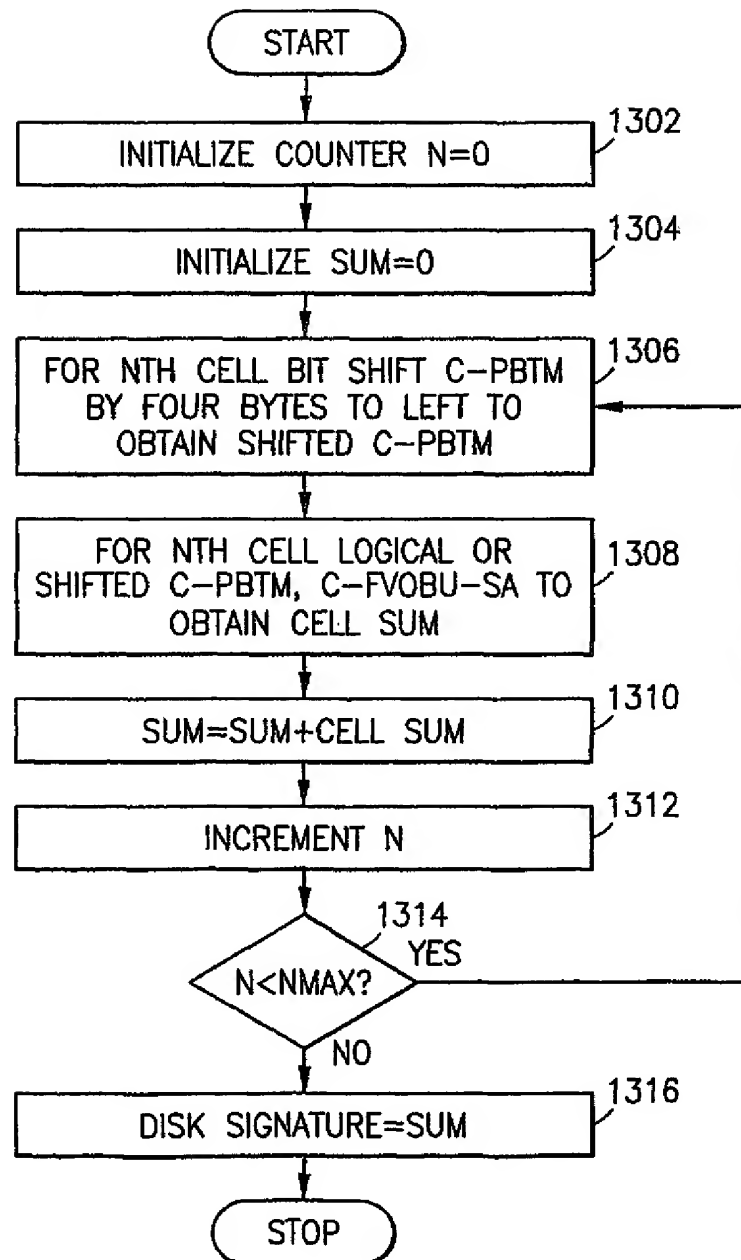
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FIG. 111100

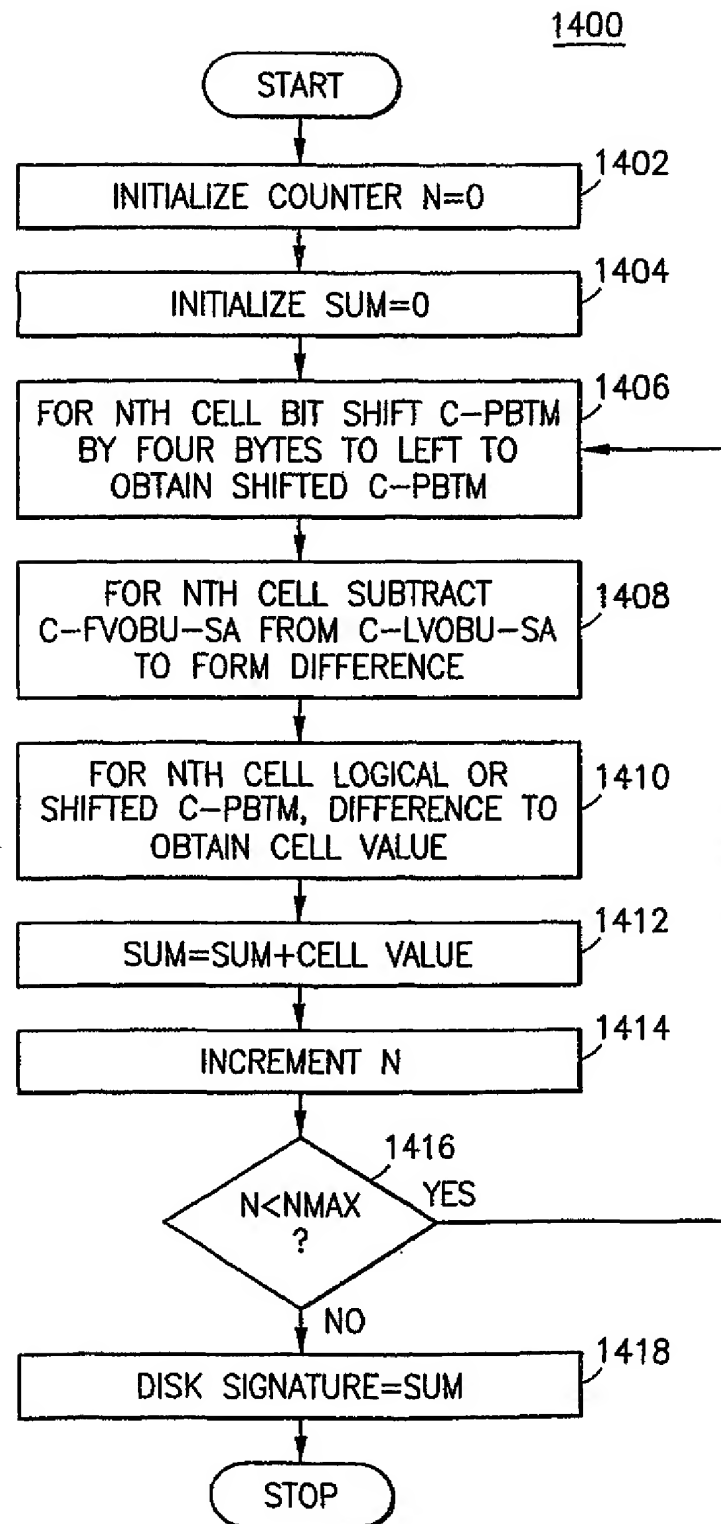
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FIG. 121100

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FIG. 131300

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FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/19452

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 15/16

US CL : 709/217

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/217

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WEST, EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,098,106 A (PHILYAW et al) 01 August 2000 (01.08.2000), col. 5, line 1 - col. 6, line 10.	1, 9-13, 18-35
Y		2-8, 14-17
Y	US 6,032,195 A (REBER et al) 29 February 2000 (29.02.2000), col. 4, line 32 - col. 5, line 47.	1, 9-13, 18-35
A		2-8, 14-17
A, P	US 6,138,151 A (REBER et al) 24 October 2000 (24.10.2000)	1-35
A	US 5,923,379 A (PATTERSON) 13 July 1999 (13.07.1999)	1-35

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

08 August 2001 (08.08.2001)

Date of mailing of the international search report

12 OCT 2001

Name and mailing address of the ISA/US

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Form PCT/ISA/210 (second sheet) (July 1998)